

**Claims**

1. Process for producing hydrogen-containing fuel gases for fuel cells by catalytic reforming of hydrocarbons and subsequent gas purification, characterized in that the catalytic reforming has two successive stages of which the first stage comprises autothermal reforming and the second stage comprises downstream steam reforming at temperatures below 650°C.
2. Process according to Claim 1, characterized in that the catalytic reforming is carried out adiabatically and the reformat mixture at the outlet from the first stage of autothermal reforming has a temperature of from 650 to 850°C.
3. Process according to Claim 1 or 2, characterized in that the reformat mixture at the outlet from the second stage of steam reforming has a temperature of from 400 to 650°C.
4. Process according to any of Claims 1 to 3, characterized in that the reformat mixture at the outlet of the autothermal reforming stage has a residual hydrocarbon content of from 0.5 to 10% by volume.
5. Process according to any of Claims 1 to 4, characterized in that catalysts comprising support bodies to which supported catalysts containing noble metals have been applied are used for both stages.
6. Process according to Claim 5, characterized in that one or more noble metals from the group consisting of rhodium, platinum and palladium immobilized on oxidic support materials are

preferably used as catalysts for the autothermal reforming and one or more noble metals from the group consisting of gold, rhodium and platinum immobilized on oxidic support materials are preferably used as catalysts for the steam reforming.

7. Process according to any of Claims 1 to 6, characterized in that the fuel gas after the two-stage reforming is passed directly without interposition of one or more heat exchangers to a gas purification stage.

8. Process according to any of Claims 1 to 7, characterized in that the gas purification stage comprises one or more water gas shift stages or one or more gas separation membranes.

9. Apparatus for producing hydrogen-containing fuel gases for fuel cells by catalytic reforming of hydrocarbons and subsequent gas purification, characterized in that it comprises two successive reactor stages for catalytic reforming, with the first reactor stage having at least one catalyst for autothermal reforming and the second reactor stage having at least one catalyst for steam reforming and no further heat exchangers being installed between the second reactor stage and the gas purification stage.

10. Use of the process according to any of Claims 1 to 8 for producing hydrogen-containing fuel gases for mobile and stationary fuel cells.

11. Use of the apparatus according to Claim 9 for producing hydrogen-containing fuel cells for mobile and stationary fuel cells.